DOCUMENT RESUME

ED 109 679 CS 202 159

AUTHOR Monson, Eileen Q.; Dawis, Rene V.
TITLE The Hierarchical Ordering of Preference for Relations in Solving Verbal Analogy Items. Technical Report No. 8.
INSTITUTION Minnesota Univ., Minneapolis. Dept. of Psychology.
SPONS AGENCY Office of Naval Research, Washington, D.C. Personnel and Training Research Programs Office.
PUB DATE Feb 75
NOTE 42p.

EDRS PRICE MF-$0.76 HC-$1.95 PLUS POSTAGE
DESCRIPTORS *Association (Psychological); Association Tests; Comprehension; Educational Research; Higher Education; *Paired Associate Learning; *Semantics; *Thought Processes; *Verbal Learning; Verbal Stimuli
IDENTIFIERS *Analogical Reasoning

ABSTRACT

Verbal analogy items, consisting of an ambiguous stimulus word pair and two unambiguous response word pairs as choice alternatives, were presented to psychology students in a counterbalanced design to discover if preferences existed between the two competing relations in each item. The data were analyzed to see if these preferences ordered themselves into a hierarchy. With only half of a full paired-comparisons matrix available for study, the data suggest that a hierarchical ordering of preferences for relations exists, with the cause-effect relation educed most readily and the order-time relation least readily. The results also suggest a need for developmental research into the origins of these preferences and investigation of the role of both individual differences and cultural differences. (Author/LL)

Technical Report No. 8

THE HIERARCHICAL ORDERING OF PREFERENCE FOR RELATIONS IN SOLVING VERBAL ANALOGY ITEMS

Eileen Q. Monson and Rene' V. Dawis

Department of Psychology
University of Minnesota
Minneapolis, Minnesota 55455

February 1975

Prepared under Contract No. N00014-67-A-0113-0030
NR 150-352
Personnel and Training Research Programs
Psychological Sciences Division
Office of Naval Research

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Report No. 8	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) The Hierarchical Ordering of Preference for Relations in Solving Verbal Analogy Items		5. TYPE OF REPORT & PERIOD COVERED Technical Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Eileen Q. Monson and Rene' V. Dawis		8. CONTRACT OR GRANT NUMBER(s) N00014-67-A-0113-0030
9. PERFORMING ORGANIZATION NAME AND ADDRESS Department of Psychology University of Minnesota Minneapolis, Minnesota 55455		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 61153N RR 042-04-01 RR 042-04 NR 150-352
11. CONTROLLING OFFICE NAME AND ADDRESS Personnel and Training Research Programs Office of Naval Research (Code 458) Arlington, Virginia 22217		12. REPORT DATE February 1975 13. NUMBER OF PAGES 31
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited. Reproduction in whole or in part is permitted for any purpose of the United States Government.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Analogy	Semantic relations
Analogical reasoning	Verbal reasoning
Analogy test	Verbal analogies
Cognition of relations	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Verbal analogy items were constructed consisting of an ambiguous stimulus word pair and two unambiguous response word pairs as choice alternatives. (Two relations are educible from ambiguous word pairs, but only one relation from unambiguous word pairs.) Both response alternatives were "correct." The items were presented to subjects in a counterbalanced design to discover if preferences exist between the two competing relations in each item. The data were analyzed to see if these preferences ordered themselves into a hierarchy.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-014-6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

With only half of a full paired-comparisons matrix available for study, the data suggest that a hierarchical ordering of preferences for relations exists, with the cause-effect relation educed most readily and the order/time relation least readily. The results also suggest a need for developmental research into the origins of these preferences and investigation of the role of both individual differences and cultural differences.

The Hierarchical Ordering of Preferences for Relations in Solving Verbal Analogy Items

Eileen Q. Monson and Rene' V. Dawis

In previous technical reports in this series, it has been shown that type of relation and relation eduction frequency are important variables influencing the difficulty of verbal analogy items. The Relation Eduction Index (REI) was developed as a measure of the frequency with which a given logical relation is educed in a given word pair. In developing REI norms, it was found that REIs differed from word pair to word pair for given relations, and from relation to relation for given word pairs. It was also found that the same word pair could have equivalent REIs for two or more relations.

If two relations are both available to be educed at the same high strength, is there a preference for one over the other? Would such preferences, if they exist, order themselves into a hierarchy? These questions were among those raised by the data on REI norms. The present report is about a study conducted to investigate these two questions.

Method

Instrumentation

Using the REI norms for college students (Technical Report No. 4; Soriano, Dawis, & Siojo, 1974) verbal analogy items were constructed, consisting of an "ambiguous" word pair as the stimulus and two "unambiguous" word pairs as the response alternatives. "Ambiguous" word pairs, i.e., with two highly educible relations, were selected according to the following rules:

(1) The word pair must have only two relations with REIs of 70 or higher.

(2) The two relations should not differ in REI value by more than five points.

(3) The two relations should have REI values higher than all other relations by at least 20 points.

"Unambiguous" word pairs were selected to meet the following rules:

(1) The word pair must have only one relation with an REI of 70 or higher.

(2) This relation should have an REI value higher than all other relations by at least 20 points.

Thus, an analogy item could be constructed with an ambiguous word pair as the stimulus pair, and two unambiguous word pairs (one for each of the stimulus-pair's highly educible relations) as the response pairs (alternatives). One additional rule was needed: The two unambiguous word pairs chosen for the same item should not differ in REI value for their most highly educible relation by more than 10 points. (A more stringent criterion of five points was set originally, but only a few items could be constructed which met this criterion.) Furthermore, stimulus and response word pairs were matched as closely as possible in REI value for the relations of concern (the most highly educible relations).

The items were put together in an instrument called the Relation Recognition Exercise. Two forms, A and B, of the Exercise were constructed with different item order and with the order of the two response word pairs for each item reversed on the second form. The Exercise booklet, shown in the Appendix, contained a cover page, biographical information sheet, instructions, and 68 items.

Table 1 shows the number of items written for each pairing of relations. As Table 1 shows, it was easier to write items for some pairings than for others, and items could not be written for half of the possible pairings.

The eight relations used in the Relation Recognition Exercise were:

(1) Class-member--when one member of the pair includes the other or is a member of the other.

(2) Extrinsic Functional--when both members in the pair perform the same activity or have the same use.

(3) Intrinsic Functional--when one member of the pair performs some activity on or for the other.

Table 1

Number of Verbal Analogy Items

Written for Each Pairing of Relations

First Relation	Second Relation[a]						
	2	3	4	5	6	7	8
1. Class-Member	3	11	2	12	5	--	1
2. Extrinsic Functional		1	17	1	--	--	1
3. Intrinsic Functional			--	--	--	1	--
4. Similarity/Equivalence				--	--	--	--
5. Conversion/Process					2	--	--
6. Order/Time						6	3
7. Opposite							--
8. Cause-Effect							

Note. Two items were dropped (see text), to leave a total of 66 items.

[a]Same relation as designated under "First Relation."

(4) Similarity/Equivalence--when both members of the pair are similar or equivalent.

(5) Conversion/Process--when one member of the pair is converted or processed from the other.

(6) Order/Time--when both members of the pair follow one another in a certain order or in time.

(7) Opposite--when the two members of the pair are opposites to each other.

(8) Cause-Effect--when one member of the pair is a cause of the other (the other is an effect of the first).

Subjects

The subjects for this study were college students from an introductory psychology course. The majority of students were middle to upper class, white, freshmen or sophomores, and included roughly equal numbers of males and females. Each subject volunteered for the study in exchange for two points toward the final course grade. A total of 71 individuals completed the Relation Recognition Exercise, with 35 taking Form A and 36, Form B.

Data Collection Procedure

The subjects were given alternative blocks of time during which they could report for the study. Subjects reported usually alone or in small groups of two or three. Upon reporting, the subjects were told about the study (which was described to them as a "relation recognition exercise"), and they were given the test booklets. The subjects first filled out the biographical information sheet (see Appendix for a copy). Then they read the directions silently and proceeded to complete the Exercise. No time limits were given for completion of the Exercise.

Data Analysis

Two items were eliminated from the study. One of them was found to be

reproduced incorrectly on Form B. A recheck had earlier shown that the two items failed to meet the criteria for item construction discussed above.

To check for response set, the influence of order of presentation of the response alternatives was analyzed by comparing response distributions on the two forms. This analysis was done first, before proceeding with other analyses.

The main data analyses were directed at the two research hypotheses: (a) whether, for a given item, there was a difference in choice of alternative, i.e., in preference for one relation over the other in the eduction of relations; and (b) if such differences existed, whether the relations were ordered in these preferences in a recognizable hierarchy. For the first hypothesis, the significance of the observed deviation from a 50-50 response distribution, expected under the null hypothesis, was tested. This was done for each item from each form and from both forms combined. For the second hypothesis, the results of the preceding analysis were summarized in an incomplete paired comparisons matrix, pairing each relation with every other relation, and a ratio was calculated of the number of times a given relation was preferred to the number of pairings for the given relation. Furthermore, the proportion of preferences (frequency of preference over total number of pairings across all subjects) for each relation was cumulated for the total data set to see if a hierarchy emerged.

Results

Table 2 shows the distribution of responses across all items in each form of the Relation Recognition Exercise. It will be recalled that order of presentation for the response alternatives was reversed for Form B, i.e., response alternative a for each item on Form A was response alternative b on the same item on Form B. A visual inspection of Table 2 shows an almost identical proportion of choices for the same response alternative regardless of position. It was therefore concluded that response set (i.e., a position preference) did not influence the results of the study to any significant degree.

Table 2

Distribution of Response Choices Across All Items of the Relation Recognition Exercise, by Form

Response Alternative	Form					
	A		B		Combined	
	N	%	N	%	N	%
a	1,091	47.23	1,225	51.56	2,316	49.42
b	1,172	50.72	1,131	47.60	2,303	49.15
No response	47	2.03	20	0.84	67	1.43

Note. Response alternative a in Form A is response alternative b in Form B and vice versa.

Table 3

Distribution of Response Choices to the Relation Recognition Exercise, by Item and Form

Relation Pairing[a]	Form A			Form B			Combined	
	Item No.	% Choosing P[b]	% Choosing Q[b]	Item No.	% Choosing P	% Choosing Q	% Choosing P	% Choosing Q
Relation 1 (P)[b] vs. 2 (Q)[b]	46	71.4	28.6	63	41.7	55.6[c]	56.3	42.3
	55	20.0	77.2	46	36.1	63.9	28.2	70.4**
	56	5.7	91.4	44	16.7	83.3	11.3	87.3**
	All[d]	32.4	65.7	All	31.5	67.6	31.9	66.7**
Relation 1 (P) vs. 3 (Q)	2	68.6	31.4	10	36.1	63.9	52.1	47.9
	5	2.9	97.1	54	5.6	94.4	4.2	95.8**
	6	51.4	48.6	5	50.0	50.0	50.7	49.3
	12	0.0	97.1	60	8.3	88.9	4.2	93.0**
	15	65.7	31.4	20	63.9	33.3	64.8	32.4**
	30	11.4	85.7	67	16.7	80.6	14.1	83.1**
	39	40.0	60.0	32	27.8	72.2	33.8	66.2**
	45	94.3	5.7	37	88.9	11.1	91.6	8.5**
	49	68.6	31.4	19	69.4	30.6	69.0	31.0**
	50	51.4	48.6	58	47.2	50.0	49.3	49.3
	63	34.3	62.9	33	38.9	61.1	36.6	62.0*
	All	44.4	54.6	All	41.2	57.8	42.8	56.2**

(continued)

Table 3 continued

Relation[a] Pairing	Form A			Form B			Combined	
	Item	% Choosing		Item	% Choosing		% Choosing	
	No.	P[b]	Q[b]	No.	P	Q	P	Q
Relation 1 (P)								
vs. 4 (Q)	37	80.0	17.1	66	80.6	16.7	80.3	16.9**
	67	37.1	57.1	3	41.7	58.3	39.4	57.8
	All	58.6	37.1		61.1	37.5	59.9	37.3*
Relation 1 (P)								
vs. 5 (Q)	18	74.3	22.9	8	58.3	41.7	66.2	32.4**
	22	51.4	45.7	17	63.9	33.3	57.8	39.4
	25	11.4	85.7	31	38.9	61.1	25.4	73.2**
	28	62.9	34.3	29	63.9	36.1	63.4	35.2*
	31	0.0	97.1	34	11.1	88.9	5.6	93.0**
	41	31.4	68.6	39	27.8	72.2	29.6	70.4**
	44	65.7	34.3	16	50.0	50.0	57.8	42.3
	48	74.3	25.7	61	52.8	41.7	63.4	33.8*
	52	40.0	60.0	13	38.9	61.1	39.4	60.6
	59	2.9	94.3	12	13.9	86.1	8.5	90.1**
	61	8.6	88.6	22	11.1	88.9	9.9	88.7**
	64	37.1	60.0	41	36.1	63.9	36.6	62.0*
	All	38.3	59.8	All	38.9	60.4	38.6	60.1**
Relation 1 (P)								
vs. 6 (Q)	13	74.3	22.9	45	69.4	30.6	71.8	26.8**
	16	48.6	48.6	68	33.3	63.9	40.9	56.3
	24	40.0	57.1	47	44.4	55.6	42.3	56.3
	33	20.0	77.1	30	27.8	72.2	23.9	74.7**
	47	97.1	2.9	40	91.7	8.3	94.4	5.6**
	All	56.0	41.7	All	53.3	46.1	54.7	43.9

(continued)

Table 3 continued

Relation[a] Pairing	Form A Item No.	Form A % Choosing P[b]	Form A % Choosing Q[b]	Form B Item No.	Form B % Choosing P	Form B % Choosing Q	Combined % Choosing P	Combined % Choosing Q
Relation 1 (P)								
vs. 8 (Q)	32	0.0	97.1	15	11.1	88.9	5.6	93.0**
Relation 2 (P)								
vs. 3 (Q)	51	20.0	80.0	9	27.8	72.2	23.9	76.1**
Relation 2 (P)								
vs. 4 (Q)	1	14.3	85.7	18	11.1	88.9	12.7	87.3**
	4	40.0	60.0	4	27.8	66.7	33.8	63.4**
	10	14.3	82.9	38	25.0	75.0	19.7	78.9**
	17	22.9	74.3	56	13.9	83.3	18.3	78.9**
	19	40.0	57.1	55	41.7	55.6	40.9	56.3
	20	20.0	77.1	48	33.3	66.7	26.8	[illegible]
	26	34.3	62.9	36	33.3	66.7	33.8	64.9*
	27	42.9	54.3	64	55.6	41.7	49.3	47.9
	29	14.3	82.9	51	27.8	72.2	21.1	77.5**
	35	22.9	74.3	65	22.2	75.0	22.5	74.6**
	36	60.0	[illegible]	21	69.4	30.6	64.8	33.8*
	42	5.7	[illegible]	27	25.0	75.0	15.5	84.5**
	53	48.6	51.4	24	50.0	50.0	49.3	50.7
	54	51.4	48.6	49	38.9	61.1	45.1	54.9
	58	40.0	57.1	57	58.3	36.1	49.3	46.5
	60	37.1	57.1	43	69.4	30.6	53.5	43.7
	68	11.4	85.7	35	22.2	77.8	16.9	81.7**
	All	30.6	67.2	All	36.8	61.9	33.7	64.5**

(continued)

Table 3 continued

Relation[a] Pairing	Form A Item No.	Form A % Choosing P[b]	Form A % Choosing Q[b]	Form B Item No.	Form B % Choosing P	Form B % Choosing Q	Combined % Choosing P	Combined % Choosing Q
Relation 2 (P)								
vs. 5 (Q)	11	20.0	77.1	1	11.1	88.9	15.5	83.1**
Relation 2 (P)								
vs. 8 (Q)	62	31.4	65.7	26	27.8	72.2	29.6	69.0**
Relation 3 (P)								
vs. 7 (Q)	65	25.7	71.4	7	30.6	66.7	28.2	69.0**
Relation 5 (P)								
vs. 6 (Q)	[redacted]	[redacted]	17.1	59	80.6	16.7	80.3	16.9**
	[redacted]	42.9	54.3	11	47.2	52.8	45.1	53.5
	All	61.4	35.7	All	63.9	34.7	62.7	35.2**
Relation 6 (P)								
vs. 7 (Q)	14	51.4	45.7	23	41.7	58.3	46.5	52.1
	23	17.1	80.0	2	25.0	75.0	21.1	77.5**
	34	60.0	37.1	6	33.3	66.7	46.5	52.1
	38	37.1	60.0	50	25.0	75.0	31.0	67.6**
	40	54.3	45.7	42	52.8	47.2	53.5	46.5
	43	14.3	85.7	14	8.3	91.7	11.3	88.7**
	All	39.1	59.1	All	31.0	69.0	35.0	64.1**
Relation 6 (P)								
vs. 8 (Q)	21	5.7	91.4	28	13.9	86.1	9.9	88.7**
[redacted]	57	20.0	77.1	53	16.7	83.3	18.3	80.3**
	66	17.1	80.0	52	13.9	86.1	15.5	83.1**
	All	14.3	82.9	All	14.8	85.2	14.6	84.0**

(continued)

Table 3 continued

[a]The relations are: 1. Class-Member; 2. Extrinsic Functional; 3. Intrinsic Functional; 4. Similarity/Equivalence; 5. Conversion/Process; 6. Order/Time; 7. Opposite; and 8. Cause-Effect.

[b]P and Q designate the response alternatives as indicated in the relation pairing column.

[c]Sums may not total 100.0% due to nonresponse.

[d]Data for all items combined for particular pairing of relations.

*$p \leq .05$ that a 50-50 hypothesis is correct.

**$p \leq .01$ that a 50-50 hypothesis is correct.

Table 3 contains the distribution of response choices for each item, separately for each form and for the two forms combined. The data are grouped by each pairing of relations. Table 3 also gives the combined data for all items of a given relation pairing. Only the data for the last two columns--for the two forms combined--were tested for significant deviation from a 50-50 hypothesis.

Examination of Table 3 shows that for the most part (in 59 of the 66 items) the data for Form A and Form B are similar, i.e., the two sets of data agree in direction of choice (which relation appeared to be preferred). Data for the two forms also agree to a large extent on degree of choice (percentage making the choice). The average absolute difference between the two forms in percentage choosing the preferred relation was 8.6%, with the difference exceeding 20% in only six of the 66 items.

Table 3 also shows that in 46 of the 66 items, one relation was educed significantly more frequently than the other. When the data for all the items pertinent to a particular relation pairing were combined, a significant preference for one relation over the other was observed for all but one of the 14 relation pairings (the exception was 1. Class-Member vs. 6. Order/Time). The preference results for these combined data are summarized in Table 4.

Table 4 shows that Relations 5 and 8 were most preferred, with each being preferred three times out of three pairings; Relations 3 and 7 were next most preferred (two out of three pairings); Relation 1 was preferred 1.5 times; Relations 2 and 4 were preferred once each, and Relation 6 was preferred only .05 times.

A different way of estimating the hierarchy of preference might proceed as follows: Relation 8 is preferred over Relations 1, 2, and 6; but Relation 1 is preferred over Relation 4, so by the rule of transitivity, Relation 8 is preferred over Relation 4 as well. By applying this rule, we get:

Table 4

Preference Matrix for the Pairing of Relations

in the Relation Recognition Exercise

Relation	Relation							
	1	2	3	4	5	6	7	8
1. Class-Member		1[a]	1	0	1	.05	--	1
2. Extrinsic Functional	0		1	1	1	--	--	1
3. Intrinsic Functional	0	0		--	--	--	1	--
4. Similarity/Equivalence	1	0	--		--	--	--	--
5. Conversion/Process	0	0	--	--		0	--	--
6. Order/Time	.05	--	--	--	1		1	1
7. Opposites	--	--	0	--	--	0		--
8. Cause-Effect	0	0	--	--	--	0	--	

[a] 1 = column relation is preferred

0 = column relation is not preferred

.05 = neither relation is preferred

-- = no pairing

$8 > 1, 2, 6, 4$

$5 > 1, 2, 6, 4$

$7 > 3, 6, 1, 2, 4$

$3 > 1, 2, 4$

$1 > 4$

$4 > 2$

$2 > 1$

$1 = 6$

We find that there are two groups of relations in terms of preferences: the preferred group consists of Relations 8, 5, 7, and 3, while the less preferred group consists of Relations 1, 2, 4, and 6.

Yet another way of estimating the hierarchy of preference is by summarizing the data in terms of the proportion of items in which a clear preference was exhibited for one relation over another. This summary is shown in Table 5. If the percentage of item preference were used as the index, the order of preference would be as follows:

8, 7, 4, 5, 3, 1, 2, 6

This ordering would be consistent with the rank order shown in preceding ways of looking at the hierarchy of preferences, except for the position of Relation 4 (which is ranked much higher here than in other estimates)

A final method of estimating the hierarchy of preference would be to sum the number of <u>times</u> (items x subjects) a relation was preferred and to take this sum as a proportion of the number of possible times it could have been preferred. Table 6 shows the results for this method. Again, the hierarchy of relation preference shown in Table 6 is consistent with previously derived hierarchies.

Table 5

Item Preference Matrix for the Pairing

of Relations in the Relation Recognition Exercise

Relation	Relation							
	1	2	3	4	5	6	7	8
1. Class-Member		2.5	6.5	0.5	7.5	2	--	1
2. Extrinsic Functional	0.5		1	13	1	--	--	1
3. Intrinsic Functional	4.5	0		--	--	--		--
4. Similarity/Equivalence	1.5	4	--		--	--	--	--
5. Conversion/Process	4.5	0	--	--		0.5	--	--
6. Order/Time	0	--	--	--	1.5		4.5	--
7. Opposite	--	--	0	--	--	1.5		3
8. Cause-Effect	0	0	--	--	--	0	--	
Total preferences	14.0	6.5	7.5	13.5	10.0	4.0	5.5	5
Number of item pairings	34	23	13	19	15	16	7	5
Preference percentage	41.2	28.3	57.7	71.0	66.7	25.0	78.6	100
Rank order	6	7	5	3	4	8	2	1

Table 6

Frequency of Preference for Relations

Across Items x Subjects

	N Preference	N Possible	% Preference
8. Cause-Effect	294	355	82.8
7. Opposite	322	497	64.8
5. Conversion/Process	660	1,065	62.0
4. Similarity/Equivalence	832	1,349	61.7
3. Intrinsic Functional	513	923	55.6
1. Class-Member	1,014	2,414	42.0
2. Extrinsic Functional	598	1,633	36.6
6. Order/Time	421	1,136	34.0

Conclusion

It would appear, from this study, that in analogy test situations in which there is a choice between relations to educe, some relations are preferred over others. In this study, the relations Cause-Effect, Opposite, Conversion/Process, and Intrinsic-Functional tended to be preferred over Similarity/Equivalence, Class-Member, Extrinsic-Functional and Order/Time. There is some suggestion from the data that a hierarchy of preference for relations exists. However, definitive evidence for such a hierarchy will require a complete paired-comparisons matrix, which was not possible to achieve for this study. Nevertheless, the data from this study are not incompatible with a hierarchy hypothesis, and indeed lend support and warrant to further investigation of the hypothesis.

Reference

Soriano, L. V., Dawis, R. V., & Siojo, L. T. Relation eduction index norms for 1,000 word pairs and 8 relations: College sample. Technical Report No. 4, February, 1974, University of Minnesota. Contract Number N00014-67-A-0113-0030, Office of Naval Research.

APPENDIX

Biographical Information Sheet

Relation Recognition Exercise, Form A

Relation Recognition Exercise, Form B

BIOGRAPHICAL INFORMATION

1. School

2. Grade _____

3. Sex
   1. Male
   2. Female

4. Age at last birthday _____

5. Race:
   1. Afro-American (Negro)
   2. Mexican-American (Chicano)
   3. American-Indian
   4. Oriental-American
   5. White
   6. Other

6. Number of children in family:
   1. 1 to 3
   2. 4 to 6
   3. 7 to 9
   4. 10 or more

7. Annual family income:
   1. less than $5,000
   2. $5,000 - $10,000
   3. $10,001 - $15,000
   4. $15,001 - $20,000
   5. more than $20,000

8. Which of the following is true of your family?
   1. Owns the house in which you live
   2. Rents the house in which you live
   3. Rents an apartment unit
   4. Lives in a public housing project

9. Which is true of your father's education?
   1. Finished eighth grade or less
   2. Went to high school but did not graduate
   3. Finished high school but did not go to college
   4. Went to college but did not get a degree
   5. Graduated with a bachelor's degree or its equivalent
   6. Did college study beyond the bachelor's level
   7. If other, please specify

10. Which is true of your mother's education?

1. Finished eighth grade or less
2. Went to high school but did not graduate
3. Finished high school but did not go to college
4. Went to college but did not get a degree
5. Graduated with a bachelor's degree or its equivalent
6. Did college study beyond the bachelor's level
7. If other, please specify

11. In which of the following categories does your father's main occupation belong? Examples of job titles within a category are shown in parenthesis.

1. Professional, technical, and managerial occupations (lawyers, doctors, teachers, engineers, writers and managers)
2. Clerical and sales occupations (typists, stenographers, salesmen and merchants)
3. Service occupations (domestic servants, barbers, protective servants, and waiters)
4. Farming, fishery, forestry, and related occupations (farmers, foresters, hunters and fishermen)
5. Processing occupations (processors of chemicals, wood, metal, food and tobacco)
6. Machine trades occupation (machinists, printers and textile workers)
7. Bench work occupation (fabricators, assemblers, repairmen)
8. Structural work occupations (metal fabricators, welders, and construction workers)
9. Miscellaneous occupations (truck drivers, packers, loggers and graphic artists)

12. In which of the following categories does your mother's main occupation belong? Example of job titles within a category are shown in parenthesis.

1. Professional, technical, and managerial occupations (lawyers, doctors, teachers, engineers, writers and managers)
2. Clerical and sales occupations (typists, stenographers, salespersons and merchants)
3. Service occupations (domestic servants, barbers, protective servants, and waiters)
4. Farming, fishery, forestry, and related occupations (farmers, foresters, hunters and fishermen)
5. Processing occupations (processors of chemicals, wood, metal, food and tobacco)
6. Machine trades occupations (machinists, printers and textile workers)
7. Bench work occupation (fabricators, assemblers, repair persons)
8. Structural work occupations (metal fabricators, welders, and construction workers)
9. Miscellaneous occupations (truck drivers, packers, loggers and graphic artists)
10. Housewife

University of Minnesota

Department of Psychology

Relation Recognition Exercise

Form A

Spring, 1974

Instructions

This exercise contains 68 items. For each item, the numbered word-pair is followed by two lettered word-pairs, a and b. Look at these two lettered word-pairs and choose the one that best represents the same relation found in the numbered word pair. Circle the letter of the word-pair you chose. Here is an example:

1. Light : Dark
   a. Book : Chapter
   b. Peace : War

The correct answer is b, because Light and Dark are opposites and Peace and War are opposites. You would thus circle the b.

You may now proceed with the exercises below. Try to answer all of the items, but do not spend too much time on any one.

1. Cash : Money
   a. Imitate : Copy
   b. Bullet : Arrow

2. Motor : Car
   a. Food : Body
   b. Coconut : Palm Tree

3. Problem : Remedy
   a. Rank : Military
   b. Vote : Elect

4. Orchard : Grove
   a. Gun : Lance
   b. Dismal : Dark

5. Foot : Shoe
   a. Planet : Earth
   b. Cigarette Butt : Ash Tray

6. Letter : Stamp
   a. Floor : Walk
   b. Orange : Section

7. Daybreak : Sunset

   a. Spring : Summer

   b. Iron : Rust

8. Egg : Bird

   a. Metal : Bullet

   b. April : September

9. Negotiation : Treaty

   a. Sand : Glass

   b. Hunger : Eat

10. Cube : Block

    a. Dismal : Dark

    b. Tomato : Carrot

11. Bran : Wheat

    a. Tomato : Carrot

    b. Butter : Milk

12. Ink : Pen

    a. Scales : Fish

    b. Gasoline : Automobile

13. Root : Stem

    a. April : September

    b. Eye : Hand

14. Summer : Winter

    a. Sunrise : Evening

    b. Buy : Sell

15. Garbage : Trash Can

    a. Spoon : Soup

    b. Angels : Heaven

16. Colt : Horse

    a. Today : Yesterday

    b. Door : Car

17. Mean : Average

    a. Box : Jar

    b. Miss : Lass

18. Grass : Seed

    a. Wheat : Chaff

    b. Metal : Bullet

19. Hover : Loom

    a. Dull : Blunt

    b. Harbor : Refuge

20. Faith : Trust

    a. Ski : Bobsled

    b. Miss : Lass

21. Boil : Steam

    a. Work : Wages

    b. Sunrise : Evening

22. Cone : Pine

    a. Metal : Bullet

    b. Water : Pool

23. Winter : Summer

a. Success : Failure

b. Monday : Tuesday

24. Bud : Flower

a. Legs : Chair

b. Autumn : Winter

25. Wax : Candles

a. Lumber : Arrow

b. Furniture : Sofa

26. Herd : Pack

a. Automobile : Wagon

b. Imitate : Copy

27. League : Union

a. Check : Coins

b. Imitate : Copy

28. Rope : Fiber

a. Butter : Milk

b. League : Team

29. Boss : Leader

a. Miss : Lass

b. Shoelace : Button

20. Court : Tennis

a. Water : Fish

b. Hatch : Ship

31. Chicken : Egg

a. Sand : Glass

b. Rat : Pets

32. Rain : Flood

a. Kin : Cousin

b. Poison : Death

33. Wound : Scar

a. Lion : Animal

b. December : January

34. Past : Present

a. Hero : Villain

b. Kid : Goat

35. Fable : Legend

a. Cannon : Rifle

b. Add : Increase

36. Hurl : Throw

a. Gloom : Melancholic

b. Military Handshake : Handshake

37. Steer : Cattle

a. Ship : Fleet

b. Latter : After

38. Birth : Death

a. Seed : Pumpkin

b. Top : Bottom

39. Sled : Runner

a. Painter : Canvas

b. December : Christmas

40. Begin : End

a. Deny : Admit

b. Sunrise : Evening

41. Grape : Wine

a. Lumber : Arrow

b. Music : Hymn

42. Essential : Necessary

a. Horse : Mule

b. Subtract : Reduce

43. Day : Night

a. Calf : Cow

b. Frown : Smile

44. Milk : Cheese

a. Oyster : Pearl

b. Iron : Rust

45. Sea : Wave

a. Grove : Tree

b. Scene : Artist

46. Dwelling : Cottage

a. Paw : Claw

b. Bowl : Plate

47. Walnut : Walnut Tree

a. Hunger : Eat

b. Peninsula : Land

48. Raisin : Grape

a. Lumber : Arrow

b. Hospital : Institution

49. Title : Book

a. Fish : Fisherman

b. City : Kingdom

50. Skin : Body

a. Wednesday : Week

b. Garage : Car

51. Hammer : Anvil

a. Army Tank : Racing Car

b. Pick : Violin

52. Hide : Leather

a. Iron : Rust

b. Arm : Elbow

53. Ring : Hoop

a. Nest : Den

b. Subtract : Reduce

54. Fool : Idiot

a. Abide : Stay

b. Lettuce : Cabbage

55. Boy : Child

a. Bacon : Ham

b. Finger : Hand

56. River : Brook

a. Tablespoon : Teaspoon

b. Oyster : Pearl

57. Wound : Pain

a. Vote : Elect

b. Success : Joy

58. Grade : Rank

a. Hourglass : Pocket Watch

b. Establish : Begin

59. Steel : Ore

a. Eye : Needle

b. Butter : Milk

60. Stack : Layer

a. Sire : Father

b. Bar : Block

61. Heat : Steam

a. Sheep : Woolen Blanket

b. Golf : Club

62. Famine : Hunger

a. Battleship : Canoe

b. Cut : Bleed

63. Door : Hinge

a. Flower : Bee

b. Animal : Elephant

64. Bean : Coffee

a. Sand : Glass

b. Second : Minute

65. Lord : Peasant

a. Umbrella : Man

b. Land : Sea

66. Infection : Fever

a. War : Sorrow

b. Autumn : Winter

67. Dog : Hound

a. December : Christmas

b. Subtract : Reduce

68. Notion : Idea

a. Mow : Shave

b. Add : Increase

University of Minnesota

Department of Psychology

Relation Recognition Exercise

Form B

Spring, 1974

Instructions

This exercise contains 68 items. For each item, the numbered word-pair is followed by two lettered word-pairs, a and b. Look at these two lettered word-pairs and choose the one that best represents the same relation found in the numbered word pair. Circle the letter of the word-pair you chose. Here is an example:

1. Light : Dark
   a. Book : Chapter
   b. Peace : War

The correct answer is b, because Light and Dark are opposites and Peace and War are opposites. You would thus circle the b.

You may now proceed with the exercises below. Try to answer all of the items, but do not spend too much time on any one.

1. Bran : Wheat
   a. Butter : Milk
   b. Tomato : Carrot

2. Winter : Summer
   a. Monday : Tuesday
   b. Success : Failure

3. Dog : Hound
   a. Subtract : Reduce
   b. December : Christmas

4. Orahard : Grove
   a. Dismal : Dark
   b. Gun : Lance

5. Letter : Stamp
   a. Orange : Section
   b. Floor : Walk

6. Past : Present
   a. Kid : Goat
   b. Hero : Villain

7. Lord : Peasant

   a. Land : Sea

   b. Umbrella : Man

8. Grass : Seed

   a. Metal : Bullet

   b. Wheat : Chaff

9. Hammer : Anvil

   a. Pick : Violin

   b. Army Tank : Racing Car

10. Motor : Car

   a. Coconut : Palm Tree

   b. Food : Body

11. Negotiation : Treaty

   a. Hunger : Eat

   b. Sand : Glass

12. Steel : Ore

   a. Butter : Milk

   b. Eye : Needle

13. Hide : Leather

   a. Arm : Elbow

   b. Iron : Rust

14. Day : Night

   a. Frown : Smile

   b. Calf : Cow

15. Rain : Flood

   a. Poison : Death

   b. Kin : Cousin

16. Milk : Cheese

   a. Iron : Rust

   b. Oyster : Pearl

17. Cone : Pine

   a. Water : Pool

   b. Metal : Bullet

18. Cash : Money

   a. Bullet : Arrow

   b. Imitate : Copy

19. Title : Book

   a. City : Kingdom

   b. Fish : Fisherman

20. Garbage : Trash Can

   a. Angels : Heaven

   b. Spoon : Soup

21. Hurl : Throw

   a. Military Handshake : Handshake

   b. Gloom : Melancholic

22. Heat : Steam

   a. Golf : Club

   b. Sheep : Woolen Blanket

23. Summer : Winter

a. Buy : Sell

b. Sunrise : Evening

24. Ring : Hoop

a. Subtract : Reduce

b. Nest : Den

25. Daybreak : Sunset

a. Iron : Rust

b. Spring : Summer

26. Famine : Hunger

a. Cut : Bleed

b. Battleship : Canoe

27. Essential : Necessary

a. Subtract : Reduce

b. Horse : Mule

28. Boil : Steam

a. Sunrise : Evening

b. Work : Wages

29. Rope : Fiber

a. League : Team

b. Butter : Milk

30. Wound : Scar

a. December : January

b. Lion : Animal

31. Wax : Candles

a. Furniture : Sofa

b. Lumber : Arrow

32. Sled : Runner

a. December : Christmas

b. Painter : Canvas

33. Door : Hinge

a. Animal : Elephant

b. Flower : Bee

34. Chicken : Egg

a. Rat : Pets

b. Sand : Glass

35. Notion : Idea

a. Add : Increase

b. Mow : Shave

36. Herd : Pack

a. Imitate : Copy

b. Automobile : Wagon

37. Sea : Wave

a. Scene : Artist

b. Grove : Tree

38. Cube : Block

a. Tomato : Carrot

b. Dismal : Dark

39. Grape : Wine

a. Music : Hymn

b. Lumber : Arrow

40. Walnut : Walnut Tree

a. Peninsula : Land

b. Hunger : Eat

41. Bean : Coffee

a. Second : Minute

b. Sand : Glass

42. Begin : End

a. Sunrise : Evening

b. Deny : Admit

43. Stack : Layer

a. Bar : Block

b. Sire : Father

44. River : Brook

a. Oyster : Pearl

b. Tablespoon : Teaspoon

45. Root : Stem

a. Eye : Hand

b. April : September

46. Boy : Child

a. Finger : Hand

b. Bacon : Ham

47. Bud : Flower

a. Autumn : Winter

b. Legs : Chair

48. Faith : Trust

a. Miss : Lass

b. Ski : Bobsled

49. Fool : Idiot

a. Lettuce : Cabbage

b. Abide : Stay

50. Birth : Death

a. Top : Bottom

b. Seed : Pumpkin

51. Boss : Leader

a. Shoelace : Button

b. Miss : Lass

52. Infection : Fever

a. Autumn : Winter

b. War : Sorrow

53. Wound : Pain

a. Success : Joy

b. Vote : Elect

54. Foot : Shoe

a. Cigarette Butt : Ash Tray

b. Planet : Earth

55. Hover : Loom

a. Harbor : Refuge

b. Dull : Blunt

56. Mean : Average

a. Miss : Lass

b. Box : Jar

57. Grade : Rank

a. Establish : Begin

b. Hourglass : Pocket Watch

58. Skin : Body

a. Garage : Car

b. Wednesday : Week

59. Egg : Bird

a. April : September

b. Metal : Bullet

60. Ink : Pen

a. Gasoline : Automobile

b. Scales : Fish

61. Raisin : Grape

a. Hospital : Institution

b. Lumber : Arrow

62. Problem : Ready

a. Vote : Elect

b. Rank : Military

63. Dwelling : Cottage

a. Bowl : Plate

b. Paw : Claw

64. League : Union

a. Imitate : Copy

b. Check : Coins

65. Fable : Legend

a. Add : Increase

b. Cannon : Rifle

66. Steer : Cattle

a. Latter : After

b. Ship : Fleet

67. Court : Tennis

a. Hatch : Ship

b. Water : Fish

68. Colt : Horse

a. Door : Car

b. Today : Yesterday

DISTRIBUTION LIST

Navy

4 Dr. Marshall J. Farr, Director
Personnel and Training Reseasch Programs
Office of Naval Research (Code 458)
Arlington, VA 22217

1 ONR Branch Office
495 Summer Street
Boston, MA 02210
ATTN: Research Psychologist

1 ONR Branch Office
1030 East Green Street
Pasadena, CA 91101
ATTN: E.E. Gloye

1 ONR Branch Office
536 South Clark Street
Chicago, IL 60605
ATTN: M. A. Bertin

1 Office of Naval Research
Area Office
207 West 24th Street
New York,NY 10011

6 Director
Naval Research Laboratory
Code 2627
Washington, DC 20390

12 Defense Documentation Center
Cameron Station, Building 5
5010 Duke Street
Alexandria, VA 22314

1 Special Assistant for Manpower
OASN (M&RA)
Pentagon, Room 4E794
Washington, DC 20350

1 LCDR Charles J. Theisen, Jr., MSC, USN
4024
Naval Air Development Center
Warminster, PA 18974

1 Chief of Naval Reserve
Code 3055
New Orleans, LA 70146

1 AFHRL/PE
Stop 63
Lackland AFB, Texas 78236

1 Navy Personnel Research and
Development Center
Code 9041
San Diego, California 92152
Attn: Dr. J. D. Fletcher

1 Dr. Lee Miller
Naval Air Systems Command
AIR-413E
Washington, DC 20361

1 CAPT John F. Riley, USN
Commanding Officer
U.S. Naval Amphibious School
Coronado, CA 92155

1 Chief
Bureau of Medicine & Surgery
Research Division (Code 713)
Washington, DC 20372

1 Chairman
Behavioral Science Department
Naval Command & Management Division
U.S. Naval Academy
Luce Hall
Annapolis, MD 21402

1 Chief of Naval Education & Training
Naval Air Station
Pensacola, FL 32508
ATTN: CAPT Bruce Stone, USN

1 Mr. Arnold Rubinstein
Naval Material Command (NAVMAT 0424)
Room 820, Crystal Plaza #6
Washington, DC 20360

1 Commanding Officer
Naval Medical Neuropsychiatric
Research Unit
San Diego, CA 92152

1 Director, Navy Occupational Task Analysis Program (NOTAP)
Navy Personnel Program Support Activity
Building 1304, Bolling AFB
Washington, DC 20336

1 Dr. Richard J. Niehaus
Office of Civilian Manpower Management
Code 06A
Washington, DC 20390

1 Department of the Navy
Office of Civilian Manpower Management
Code 263
Washington, DC 20390

1 Chief of Naval Operations (OP-987E)
Department of the Navy
Washington, DC 20350

1 Superintendent
Naval Postgraduate School
Monterey, CA 93940
ATTN: Library (Code 2124)

1 Commander, Navy Recruiting Command
4010 Wilson Boulevard
Arlington, VA 22203
ATTN: Code 015

1 Mr. George N. Graine
Naval Ship Systems Command
SHIPS 047C12
Washington, DC 20362

1 Chief of Naval Technical Training
Naval Air Station Memphis (75)
Millington, TN 38054
ATTN: Dr. Norman J. Kerr

1 Dr. William L. Maloy
Principal Civilian Advisor for Education & Training
Naval Training Command, Code 01A
Pensacola, FL 32508

1 Dr. Alfred F. Smode, Staff Consultant
Training Analysis & Evaluation Group
Naval Training Equipment Center
Code N-00T
Orlando, FL 32813

1 Dr. Hanns H. Wolff
Technical Director (Code N-2)
Naval Training Equipment Center
Orlando, FL 32813

1 Chief of Naval Training Support
Code N-21
Building 45
Naval Air Station
Pensacola, FL 32508

1 Mr. Dave Peterson
Navy Personnel R&D Center
San Diego, CA 92152

5 Navy Personnel R&D Center
San Diego, CA 92152
ATTN: Code 10

1 D. M. Gragg, CAPT, MC, USN
Head, Educational Programs Development Department
Naval Health Sciences Education and Training Command
Bethesda, MD 20014

Army

1 Headquarters
U.S. Army Administration Center
Personnel Administration Combat Development Activity
ATCP-HRO
Ft. Benjamin Harrison, IN 46249

1 Armed Forces Staff College
Norfolk, VA 23511
ATTN: Library

1 Commandant
United States Army Infantry School
ATTN: ATSH-DET
Fort Benning, GA 31905

1 Deputy Commander
U.S. Army Institute of Administrati
Fort Benjamin Harrison, IN 46216
ATTN: EA

1 Dr. Stanley L. Cohen
U.S. Army Research Institute
1300 Wilson Boulevard
Arlington, VA 22209

1 Dr. Ralph Dusek
U.S. Army Research Institute
1300 Wilson Boulevard
Arlington, VA 22209

1 Mr. Edmund F. Fuchs
U.S. Army Research Institute
1300 Wilson Boulevard
Arlington, VA

1 Dr. J. E. Uhlaner, Technical Director
U.S. Army Research Institute
1300 Wilson Boulevard
Arlington, VA 22209

1 HQ USAREUR & 7th Army
ODCSOPS
USAREUR Director of GED
APO New York 09403

Air Force

1 Research Branch
AF/DPMYAR
Randolph AFB, TX 78148

1 Dr. G. A. Eckstrand (AFHRL/AS)
Wright-Patterson AFB
Ohio 45433

1 AFHRL/DOJN
Stop #63
Lackland AFB, TX 78236

1 Dr. Robert A. Bottenberg (AFHRL/SM)
Stop #63
Lackland AFB, TX 78236

1 Dr. Martin Rockway (AFHRL/TT)
Lowry AFB
Colorado 80230

1 Major P. J. DeLeo
Instructional Technology Branch
AF Human Resources Laboratory
Lowry AFB, CO 80230

1 AFOSR/NL
1400 Wilson Boulevard
Arlington, VA 22209

1 Commandant
USAF School of Aerospace Medicine
Aeromedical Library (SUL-4)
Brooks AFB, TX 78235

1 CAPT Jack Thorpe, USAF
Flying Training Division (HRL)
Williams AFB, AZ 85224

Marine Corps

1 Mr. E. A. Dover
Manpower Measurement Unit (Code MPI)
Arlington Annex, Room 2413
Arlington, VA 20380

1 Commandant of the Marine Corps
Headquarters, U.S. Marine Corps
Code MPI-20
Washington, DC 20380

1 Director, Office of Manpower Utilization
Headquarters, Marine Corps (Code MPU)
MCB (Building 2009)
Quantico, VA 22134

1 Dr. A. L. Slafkosky
Scientific Advisor (Code RD-1)
Headquarters, U.S. Marine Corps
Washington, DC 20380

1 Chief, Academic Department
Education Center
Marine Corps Development and Education Command
Marine Corps Base
Quantico, VA 22134

Coast Guard

1 Mr. Joseph J. Cowan, Chief
Psychological Research Branch (G-P-1/62)
U.S. Coast Guard Headquarters
Washington, DC 20590

Other DOD

1 Lt. Col. Henry L. Taylor, USAF
Military Assistant for Human Resources
OAD (E&LS) ODDR&E
Pentagon, Room 3D129
Washington, DC 20301

1 Col. Austin W. Kibler
Advanced Research Projects Agency
Human Resources Research Office
1400 Wilson Boulevard
Arlington, VA 22209

1 Helga L. Yeich
Advanced Research Projects Agency
Manpower Management Office
1400 Wilson Boulevard
Arlington, VA 22209

Other Government

1 Dr. Lorraine D. Eyde
Personnel Research and Development Center
U.S. Civil Service Commission
1900 E. Street, N.W.
Washington, DC 20415

1 Dr. William Gorham, Director
Personnel Research and Development Center
U.S. Civil Service Commission
1900 E. Street, N.W.
Washington, DC 20415

1 Dr. Vern Urry
Personnel Research and Development Center
U.S. Civil Service Commission
1900 E. Street, N.W.
Washington, DC 20415

1 Dr. Andrew R. Molnar
Technological Innovations in Education
National Science Foundation
Washington, DC 20550

1 U.S. Civil Service Commission
Federal Office Building
Chicago Regional Staff Division
Attn: C. S. Winiewicz
Regional Psychologist
230 South Dearborn Street
Chicago, IL 60604

Miscellaneous

1 Dr. Scarvia B. Anderson
Educational Testing Service
17 Executive Park Drive, N.E.
Atlanta, GA 30329

1 Dr. John Annett
The Open University
Milton Keynes
Buckinghamshire
ENGLAND

1 Dr. Richard C. Atkinson
Stanford University
Department of Psychology
Stanford, CA 94305

1 Dr. Gerald V. Barrett
University of Akron
Department of Psychology
Akron, OH 44325

1 Dr. Bernard M. Bass
University of Rochester
Management Research Center
Rochester, NY 14627

1 Mr. Kenneth M. Bromberg
Manager - Washington Operations
Information Concepts, Inc.
1701 North Fort Myer Drive
Arlington, VA 22209

1 Century Research Corporation
4113 Lee Highway
Arlington, VA 22207

1 Dr. Kenneth E. Clark
University of Rochester
College of Arts & Sciences
River Campus Station
Rochester, NY 14627

1 Dr. Norman R. Dixon
Room 170
190 Lothrop Street
Pittsburgh, PA 15260

1 Dr. Robert Dubin
University of California
Graduate School of Administration
Irvine, CA 92664

1 Dr. Marvin D. Dunnette
University of Minnesota
Department of Psychology
Minneapolis, MN 55455

1 ERIC
Processing and Reference Facility
4833 Rugby Avenue
Bethesda, MD 20014

1 Dr. Victor Fields
Montgomery College
Department of Psychology
Rockville, MD 20850

1 Dr. Edwin A. Fleishman
American Institutes for Research
Foxhall Square
3301 New Mexico Avenue, N.W.
Washington, DC 20016

1 Dr. Robert Glaser, Director
University of Pittsburgh
Learning Research & Development Center
Pittsburgh, PA 15213

1 Mr. Harry H. Harman
Educational Testing Service
Princeton, NJ 08540

1 Dr. Richard S. Hatch
Decision Systems Associates, Inc.
11428 Rockville Pike
Rockville, MD 20852

1 Dr. M. D. Havron
Human Sciences Research, Inc.
7710 Old Spring House Road
West Gate Industrial Park
McLean, VA 22101

1 HumRRO
Division No. 3
P.O. Box 5787
Presidio of Monterey, CA 93940

1 HumRRO
Division No. 4, Infantry
P.O. Box 2086
Fort Benning, GA 31905

1 HumRRO
Division No. 5, Air Defense
P.O. Box 6057
Fort Bliss, TX

1 HumRRO
Division No. 6, Library
P.O. Box 428
Fort Rucker, IL 36360

1 Dr. Lawrence B. Johnson
Lawrence Johnson & Associates, Inc.
200 S. Street, N.W., Suite 502
Washington, DC 20009

1 Dr. Steven W. Keele
University of Oregon
Department of Psychology
Eugene, OR 97403

1 Dr. David Klahr
Carnegie-Mellon University
Department of Psychology
Pittsburgh, PA 15213

1 Dr. Frederick M. Lord
Educational Testing Service
Princeton, NJ 08540

1 Dr. Ernest J. McCormick
Purdue University
Department of Psychological
Sciences
Lafayette, IN 47907

1 Dr. Robert M. Mackie
Human Factors Research, Inc.
6780 Cortona Drive
Santa Barbara Research Park
Goleta, CA 93017

1 Mr. Edmond Marks
405 Old Main
Pennsylvania State University
University Park, PA 16802

1 Dr. Leo Munday, Vice-President
American College Testing Program
P.O. Box 168
Iowa City, IA 52240

1 Mr. A. J. Pesch, President
Eclectech Associates, Inc.
P.O. Box 178
North Stonington, CT 06359

1 Mr. Luigi Petrullo
2431 North Edgewood Street
Arlington, VA 22207

1 Dr. Diane M. Ramsey-Klee
R-K Research & System Design
3947 Ridgemont Drive
Malibu, CA 90265

1 Dr. Joseph W. Rigney
University of Southern California
Behavioral Technology Laboratories
3717 South Grand
Los Angeles, CA 90007

1 Dr. Leonard L. Rosenbaum, Chairman
Department of Psychology
Montgomery College
Rockville, MD 20850

1 Dr. George E. Rowland
Rowland and Company, Inc.
P.O. Box 61
Haddonfield, NJ 08033

1 Dr. Arthur I. Siegel
Applied Psychological Services
404 East Lancaster Avenue
Wayne, PA 19087

1 Dr. C. Harold Stone
1428 Virginia Avenue
Glendale, CA 91202

1 Mr. Dennis J. Sullivan
725 Benson Way
Thousand Oaks, CA 91360

1 Dr. Benton J. Underwood
Northwestern University
Department of Psychology
Evanston, IL 60201

1 Dr. David J. Weiss
University of Minnesota
Department of Psychology
Minneapolis, MN 55455

1 Dr. Anita West
Denver Research Institute
University of Denver
Denver, CO 80210